



No. _____ of _____

USAMV form 0101020104 (discipline code)

SUBJECT OUTLINE**1. Information on the programme**

1.1. Higher education institution	University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca
1.2. Faculty	Agriculture
1.3. Department	Crop Plant
1.4. Field of study	Agronomy
1.5. Cycle of study¹	Bachelor
1.6. Specialization/ Study programme	Agriculture
1.7. Form of education	Full time

2. Information on the discipline

2.1. Discipline name		GENETICS 1						
2.2. Course coordinator				Lecturer PhD. Ioana Virginia Berindean				
2.3. Seminar/ laboratory/ project coordinator				Biologist PhD. Ionut RACZ				
2.4. Year of study	II	2.5. Semester	I	2.6. Evaluation type	summative	2.7. Discipline status	Content ²	DF
							Compulsoriness ³	DI

3. Total estimated time (teaching hours per semester)

3.1. Hours per week – full time programme	4	out of which: 3.2. lecture	2	3.3. seminar/ laboratory/ project	2
3.4. Total number of hours in the curriculum	56	out of which: 3.5. lecture	28	3.6. seminar/laboratory	28
Distribution of the time allotted					hours
3.4.1. Study based on books, textbooks, bibliography and notes					20
3.4.2. Additional documentation in the library, electronic platforms and field experiences					15
3.4.3. Preparing seminars/ laboratories/ projects, subjects, reports, portfolios and essays					15
3.4.4. Tutorials					4
3.4.5. Examinations					10
3.4.6. Other activities					
3.7. Total hours of individual study	64				
3.8. Total hours per semester	120				
3.9. Number of credits⁴	4				

4. Prerequisites (if applicable)

4.1. curriculum-related	Botany, Biochemistry
4.2. skills-related	

5. Conditions (if applicable)

5.1. for the course	The course is interactive, students can ask questions about the content of the exhibition. The university discipline requires the observance of the start and end time of the course. No other activities are tolerated during the lecture, mobile phones should be closed. Delay of students to the course and laboratory will not be tolerated as this proves disruptive to the educational process.
5.2. for the seminar/ laboratory/ project	In the practical works it is compulsory the presence each student, they will carry out individual activities with the laboratory materials made available and described previously by the teacher. The academic discipline is required during the entire duration of the work.

6. Cumulated specific competences

Professional competences	<ul style="list-style-type: none"> - To know the terminology used in Genetics - To demonstrate the ability to properly use the notions, concepts and legacies specific to the molecular and cellular levels of organization and functioning of living matter. - To acquire the use of knowledge about heredity at the molecular and cellular level, in scientific and technological applications. - Have the ability to critically evaluate interventions on the molecular and cellular basis of heredity, including from the perspective of bioethics principles.
Transversal competences	<ul style="list-style-type: none"> - To show concern for professional development by training the skills of a researcher; - To participate in the research activities of the discipline laboratories; - To demonstrate the involvement in scientific activities, such as the elaboration of articles and specialized studies; - To participate in projects of a scientific nature, compatible with the requirements of integration in European education.

7. Discipline objectives (based on the cumulated specific competences)

7.1. General objective	- To learn the mechanisms underlying the hereditary phenomenon and the causes that determine the variability of living organisms.
7.2. Specific objectives	<ul style="list-style-type: none"> - To understand the material basis of heredity and variability at the cellular and molecular level; - To understand the evolution process in the relation of organisms with the environment; - To be able to apply the theoretical notions of genetics in the practical activities of creating new varieties of plants, able to make better use of technological and environmental conditions in order to obtain high quality and high yields.

8. Content

8.1. COURSE Number of hours -28	Teaching methods	Observation (1 lecture = 2 hours)
Genetics - science of heredity and variability The object of study of genetics Research methods used in genetics studies (the diversification of genetics and the connection with other sciences) The biological material used in genetics studies The purpose and importance of genetics, achievements and perspectives	Lecture	1 lecture
Cell and heredity Viruses - a way of acellular organization of living matter Cellular organization of genetic material in prokaryotes Cellular organization of genetic material in eukaryotes Chromosome - morphology, structure, chemical composition; particular types of chromosomes; karyotype The cell cycle. Mitosis - genetic significance; factors that may influence the development of mitosis; types of mitosis The cell cycle. Meiosis - development, genetic significance Comparative characteristics of mitosis and meiosis Gametogenesis in animals and plants Fertilization in animals and plants Life cycle in animals and plants, genetic significance Genetic recombination in bacteria: bacterial transformation, conjugation, transduction and sex addiction Life cycle and genetic recombination of viruses	Lecture	4 lectures
Mendelian heredity Heredity of qualitative characters Dominant monogenic transmission - monohybridization, polyhybridization and backcrossing Intermediate, co-dominant, partially dominant and super-dominant monogenic transmission	Lecture	2 lectures
Particularities of monogenic transmission Pleiotropy, gene penetrance and expressivity, dominance reversal, paramutation Hereditary transmission of characters in the case of interaction between non-genes - complementarity, epistasy Real deviations from Mendelian segregation - lethality; preferential segregation;	Lecture	3 lectures

chromosome nondisjunction and nonrandomized zygote formation Linkage and crossing-over Complete and incomplete linkage, biological significance Linkage intensity, recombination frequency and distance between genes Cross-over as a cytological phenomenon and its relation to genetic recombination The mechanism of production and factors that can influence the frequency of the crossingover Chromosomal maps Polygenic transmission Heredity of quantitative characters Types of polygenic systems and the mechanism of hereditary transmission Genetic parameters and derived genetic parameters Research on the genetics of intelligence	Lecture	2 lectures
	Lecture	2 lectures

8.2. PRACTICAL WORKS Number of hours - 28	Teaching methods	Observation 1 lab work (2 hours/work)
Working methods and techniques used in cytogenetics - The cell cycle of mitotic division; - Duration of the mitotic cell cycle; - The karyotype - The cell cycle of meiotic division - Statistical analysis of qualitative characters - Monohybridization and backcross - Hybridization and backcross - Interaction between non-allele genes - Linkage and crossing-over - Chromosomal maps Verification of knowledge	Preparation of biological material and dyes Highlighting chromosomes in mitosis Making the karyotype Highlighting chromosomes in meiosis Attribution test and test χ^2 Problems of applied genetics Problems of applied genetics Problems of applied genetics Problems of applied genetics Problems of applied genetics Problems of applied genetics	1 lab work 2 lab work 1 lab work 1 lab work 2 lab work 1 lab work 1 lab work 1 lab work 1 lab work 1 lab work 1 lab work 1 lab work
<i>Compulsory bibliography:</i> 1. Course notes 2. BOTEZ, C., ELENA TĂMAȘ, 2001, <i>Genetica</i> , Ed.Academic Pres, Cluj-Napoca; 3. ELENA TĂMAȘ, C. BOTEZ, 2012, <i>Genetics</i> , Academic Pres Ed., Cluj-Napoca;		
<i>Optional bibliography:</i> 1. BOTEZ C., 1991, <i>Genetics, Tipa Agronomy, Cluj Napoca</i> 2. GALLIA BUTNARU, I.NICOLAE, ELENA, TĂMAȘ, 1999, <i>Genetics</i> , Mirton Ed., Timisoara 3. CHRISTMAS, T Luana JENSEN, 2004, <i>Genetics and the future of humanity</i> . Albatros Publishing House		

9. Corroborating the discipline content with the expectations of the epistemic community representatives, of the professional associations and of the relevant employers in the corresponding field

In order to identify ways of modernizing and continuously improving the teaching and the content of the courses, with the most current topics and practical problems, the teachers participate in sessions of scientific communications and specialized congresses as well as in meetings with the specialists in the field of genetics and plant improvement .

10. Evaluation

Type of activity	10.1. Evaluation criteria	10.2. Evaluation type	10.3. Percentage of the final grade
10.4. Course	Knowledge of terminology used in genetics Understanding the cellular organization of living matter and genetic material Knowledge of the aspects of classical genetics Understanding the sources of recombinant genetic variability Learning the concepts of quantitative genetics	Continuous (VP)	70%
10.5. Seminar/Laboratory	Acquisition of the problems dealt with in the course and practical works Recognition of the phases of the mitotic and meiotic cell cycle Preparation of the karyotype	Continuous (VP)	30%

	The ability to solve problems of applied genetics		
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10.6. Minimum performance standards

Knowledge of scientific information transmitted through lectures and practical papers at an acceptable level. Obtaining the passing grade for the on-the-spot checks for practical and colloquial works is a condition of promotability..

- 1 Cycle of studies - choose one of the three options: Bachelor/Master/Ph.D.
- 2 according to the educational plan
- 3 Discipline status (compulsoriness) - choose one of the options - **DI** (compulsory discipline) **DO** (optional discipline) **DFac** (facultative discipline).
- 4 One credit is equivalent to 25-30 hours of study (teaching activities and individual study).

Filled in on
04.09.2019

Course coordinator
Lecturer PhD. Ioana Virginia BERINDEAN

Laboratory work/seminar coordinator
Biologist PhD. Ionuț RACZ

Approved by the
department on
05.09.2019



Head of the Department
Prof.dr. Marcel DUDA

